June 27, 1933. H. C. EDWARDS 1,915,521

CRANK CASE BREATHER CAP

Filed Sept. 22, 1931

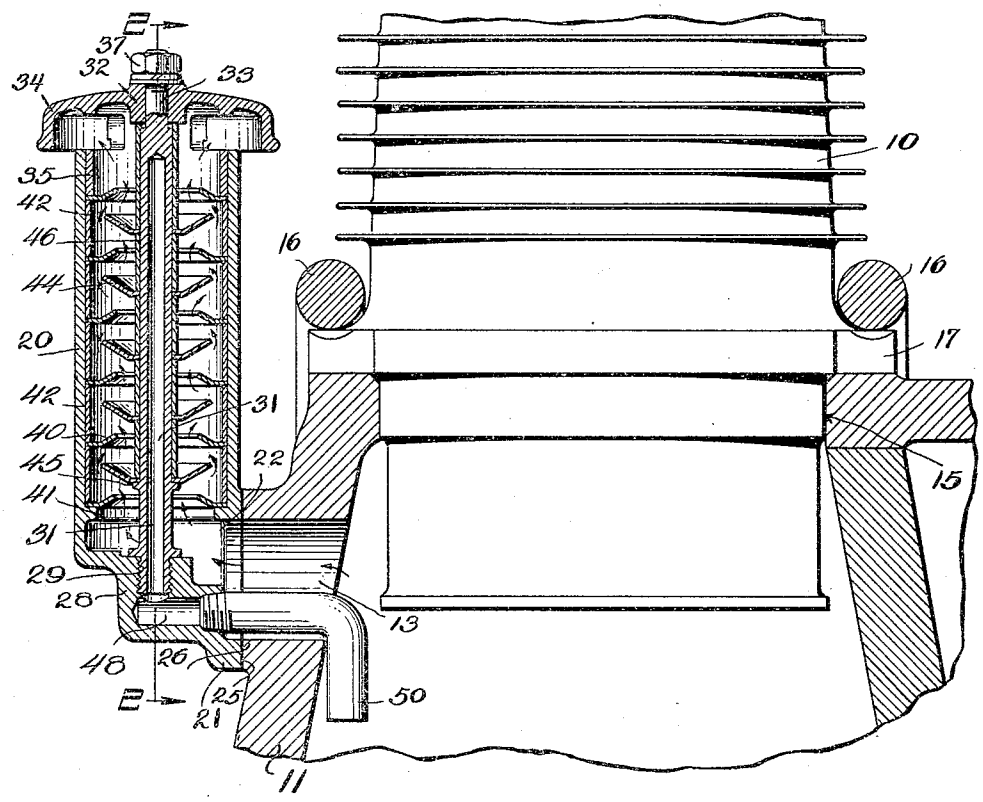


FIG. I

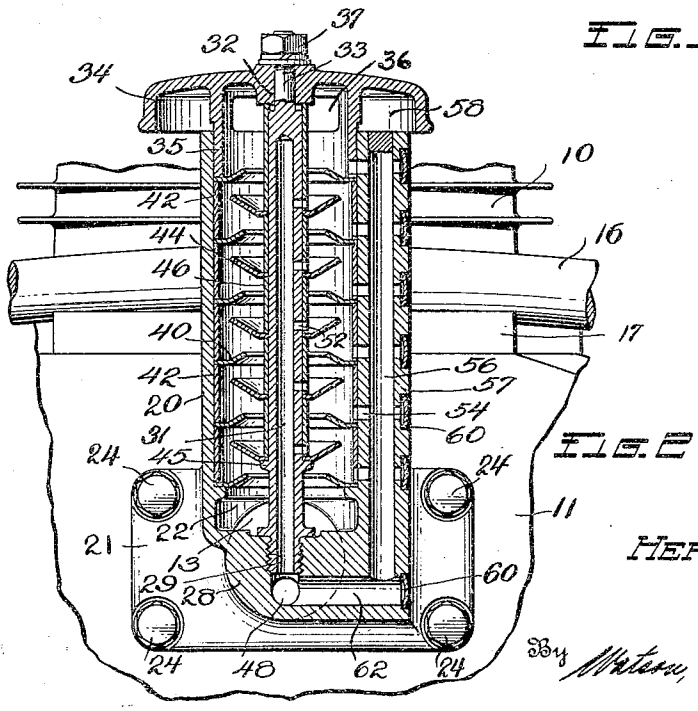


FIG. 2

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UNITED STATES PATENT OFFICE

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CRANK CASE BREATHER CAP

Application filed September 22, 1931. Serial No. 564,398.

This invention relates to internal combustion engines and has for its object the provision of means for preventing the discharge of oil from the breather opening or other vent in the crankcase of the engine.

The primary purpose of the breather opening is to equalize the difference in pressure developed during the operation of the engine between the interior of the crankcase and the surrounding atmosphere and air passing out through the breather opening frequently carries with it the fine particles of oil commonly referred to as spray. Considerable difficulty has been experienced in preventing this discharge of oil spray which is particularly objectionable in engines used for the propulsion of aircraft. Oil thus discharged from aircraft engines splashes over the engine and associated parts causing an unsightly appearance and is sometimes blown rearwardly on the windshield of the plane, thereby obscuring the vision of the pilot.

It is a feature of this invention to provide means associated with the vent in the crankcase and affording a circuitous path for air discharging from the crankcase for the purpose of separating the oil spray from the air, and means for collecting and returning this oil to the crankcase.

It is a more specific object of the invention to provide means adapted for attachment to the breather pipe or vent in the crankcase of an internal combustion engine, comprising a plurality of baffles extending into the path of the discharging air and a return passage separate from the path of the discharging air and communicating with the upper surface of the baffles for returning oil to the crankcase.

Further objects and features of the invention will be apparent from the following description taken in connection with the accompanying drawing, in which

Figure 1 is a fragmentary sectional view through the crankcase and breather pipe illustrating the principles of the invention; and

Figure 2 is a section on the line 2—2 of Figure 1.

The invention has been illustrated as applied to a radial internal combustion engine of a type recently developed for use in the propulsion of aircraft and including a cylinder 10 and a crankcase 11 having a vent 13. Each cylinder is seated in an opening 15 in the peripheral wall of the crankcase and is retained in position therein by annular bands 16 passing over flanges 17 formed adjacent the base of each cylinder. It will of course be understood from the following description that the invention is not restricted to this type of engine.

A housing 20, preferably substantially cylindrical, is formed adjacent its lower end with a flange 21 by which the housing may be secured by bolts 24 to the crankcase. If desired a boss 26 having a flat face may be formed on the crankcase and a gasket 25 may be interposed between this boss and the flange 21 of the housing to ensure against leakage of oil. It will be observed that the vent 13 communicates with the opening 22 leading to the interior of the housing 20.

Adjacent the opening 22 the housing 20 is provided with an enlarged portion 28 having an opening 29 therein threaded to receive one end of a hollow stem 31 extending substantially axially of the housing 20. Adjacent its upper end the stem 31 is provided with a threaded stud 33 which is adapted to project through an opening in a boss 32 formed centrally of the cover 34. An inwardly extending annular flange 35 on the interior of this cover having openings 36 therein to permit the flow of air is dimensioned to fit within the upper end of the housing 20 so that the cover may be firmly secured in position on the housing by means of a lock washer and nut 37 threaded on the upper end of the stem 31. Thus air may pass from the crankcase through the housing and out through the openings 36 in the annular flange 35.

The means provided within the housing 20 to retard the flow of air through the opening and to collect the particles of oil carried by the air consists of two sets of baffles, one set being carried by the housing 20 and ex-

tending inwardly and another set being carried by the stem 31 and extending outwardly. The baffles 40 of the outer set comprise annular disks slightly cupped as shown in the drawing and spaced within the housing by sleeves 42, the baffles 40 and sleeves 42 having a snug fit within the interior of the housing, and the lowermost baffle being seated on an annular flange 41 extending inwardly of the housing. The flange 35 on the cover 34 engages the uppermost baffle 40 and thus holds the entire set of outer baffles and sleeves firmly in position when the nut 37 is tightened to clamp the cover against the housing 20 and the upper spacing member. Similarly the set of inner baffles 44 and sleeves 46 are fitted snugly around the exterior of the stem 31, the lowermost baffles seating on an annular lip 45 formed on the stem 31 and the uppermost sleeve being engaged by the boss 32 on the cover 34 to clamp the entire set of baffles in position. Air discharged outwardly through the housing 20 is thus caused to follow a circuitous path as indicated by the arrows in Figure 1 and the oil spray is deposited on the baffles and retained thereon by reason of their cupped shape out of the path of the discharging air.

It will be noted that the interior of the hollow stem 31 communicates with an opening 48 in the enlarged portion 28 at the lower end of the housing and that the walls defining this opening are threaded to receive a discharge pipe 50. Furthermore, the stem 31 is drilled at spaced points to provide apertures 52 communicating through similar apertures in the sleeves 46 with the interior of the housing 20 adjacent the base of each of the inner baffles 44 as shown in the drawing so that oil deposited on these baffles, when accumulated in sufficient amount, will drain out through the apertures 52, downwardly through the interior of the stem 31 and pass out through the opening 48 for discharge into the crankcase through the pipe 50.

Similarly the oil is drained from the outer baffles 40 by means of openings 54 extending through the wall of the housing 20 and the contiguous sleeves 42, these openings communicating with the interior of the housing adjacent the base of each of the cup shaped baffles 40. The oil is discharged from the openings 54 into a passage 56 drilled in a boss 57 formed integral with the housing 20, the upper end of the passage 56 being closed by a plug 58. The apertures 54 may be conveniently formed by drilling through the boss 57 transversely of the passage 56 as shown in Figure 2 of the drawing, these drilled holes being closed at their outer ends by spring plugs 60. Passage 56 communicates at its lower end with a transversely extending passage 62 which in turn opens into the passage 48, the passage 62 being similarly formed by drilling through the enlarged portion 28 of the housing and closing the outer end of the drilled hole with the plug 60.

It will thus be seen that any oil collecting on either the inner or outer set of baffles drains downwardly through passages separated from the current of the discharging air and there is no possibility that the oil thus returned to the crankcase will be drawn into the moving stream of air.

It will be understood that the housing 20 need not be attached directly to the crankcase but may be constructed as an attachment for the usual upturned breather pipe. It will also be understood that the detailed description of the device shown in the drawing is intended merely as an illustration of the principles of the invention and that such alterations of the embodiment of the invention disclosed herein are contemplated as fall within the spirit and scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a device for attachment to the crankcase vent of an internal combustion engine, the combination of a chamber affording a discharge passage for air vented from the crankcase, a conduit constituting a drain for oil vented with the air, said conduit extending within said chamber and being spaced from the wall thereof, a plurality of baffles extending outwardly of said conduit and toward but spaced from the chamber wall for delivering oil to said conduit, a second conduit constituting a drain for oil vented with the air, and a plurality of baffles extending inwardly from the chamber wall toward but spaced from said first named conduit and interleaved between said first named baffles for delivering oil to said second conduit.

2. In a device for attachment to the crankcase vent of an internal combustion engine, the combination of a substantially cylindrical chamber affording a discharge passage for air vented from the crankcase, a member extending axially within and spaced from the wall of the said chamber having a drain passage therein, a plurality of baffles spaced lengthwise of said member and extending outwardly thereof toward the chamber wall for collecting and delivering oil from the vented air to said drain passage, a plurality of baffles carried by the chamber wall, said last named baffles extending inwardly toward said member and between said first named baffles, said chamber being provided with a drain passage for receiving collected oil from said last named baffles, and means for returning oil from said drain passages to said crankcase.

3. In a device for attachment to the crankcase vent of an internal combustion engine, the combination of a substantially cylindrical chamber affording a discharge passage

for air vented from the crankcase, a member extending axially within and substantially centrally of said chamber having a drain passage therein, a plurality of baffles spaced lengthwise of said member and extending outwardly thereof toward the chamber wall for collecting and delivering oil from the vented air to said drain passage, a plurality of baffles carried by the chamber wall, said last named baffles extending inwardly toward said member and between said first named baffles, means affording a second drain passage extending longitudinally of the chamber and adjacent the chamber wall for receiving collected oil from said last named baffles, and means for returning oil from said drain passages to said crankcase.

In testimony whereof I hereunto affix my signature.

HERBERT C. EDWARDS.